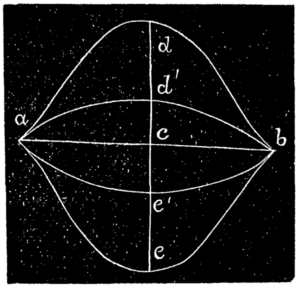
Equation (4) may be written

$$y = \pm \frac{a^2 - x^2}{2a \pm \sqrt{(a^2 - x^2)}},$$



and hence represents four branches, as in the marginal diagram. $a\,d'\,b\,d\,a$ is the area as found by Prof. Johnson; $a\,e'\,b\;d\,a$ is the area as found by us, and $a\,e'\,b\,d'\,a$, is the area as found by Messrs. Seitz, Heaton and Baker.

Prof. Johnson writes as follows:—

"The expression given on page 156, line 2, is the value of

$$\int \frac{d\theta}{2 + \cos\theta} \text{ and not of } \int \frac{d\theta}{2 + \sin\theta},$$

but the result is not affected, since, if we put $\theta = \theta' - \frac{1}{2}\pi$, we have

$$\int_0^{2\pi} \frac{d\theta}{2 + \cos\theta} = \int_{\frac{1}{2}\pi}^{\frac{5}{2}\pi} \frac{d\theta'}{2 + \sin\theta'} = \int_0^{2\pi} \frac{d\theta}{2 + \sin\theta}."$$

NOTE ON THE POLYNOMIAL THEOREM.

BY PROF. W. W. JOHNSON.

THE Binomial Theorem may be written in the form

$$\frac{(a+b)^n}{n!} = \frac{a^n}{n!} + \frac{a^{n-1}}{n-1!} \cdot \frac{b}{1} + \frac{a^{n-2}}{n-2!} \cdot \frac{b^2}{2!} + \ldots$$

and if we put ${}_ra = \frac{a^r}{r!}$ (we might call ${}_ra$ the rth *pyramid* of a, since ${}_2a$ is the area of a triangle whose base and altitude are a, and ${}_3a$, the volume of a pyramid whose base is ${}_2a$ and altitude a), this becomes

$${}_n(a+b) = \Sigma \,.\, {}_ra_sb,$$

where $r + s = n$ and r admits of all values from 0 to n inclusive. It follows at once that

$${}_n(a+b+c) = \Sigma \,.\, {}_p(a+b)\,{}_tc = \Sigma \,.\, {}_ra_sb_tc,$$

where $r+s+t = n$; and in general

$${}_n(a+b+c+\ldots) = \Sigma \,.\, {}_ra_sb_tc \ldots$$

where $r+s+t+\ldots = n$. This last equation is a form of the multinomial theorem.